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Anti-fogging transparent water-absorbing coating material - comprises copolymer of quat. ammonium salt contg. monomer and acrylic monomer, to prevent dew formation and fogging of transparent glass and plastics

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Number of Countries: 001 Number of Patents: 001

Patent Family:

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Abstract (Basic): JP 5295317 A

Coating material consists chiefly of copolymer (A) of at least one quat. ammonium salt contg. monomer (A1) selected from the cpds. of formulae (1), (2), (3) and (4) and at least one acrylic monomer (A2) of formula CH₂-C-COO-R in which Y = H or methyl and R = alkyl gp.

In (1), (2), (3) and (4), Y = H or methyl, R1 = -CH₂-, -C₂H₄- or -C₃H₆-, Q = H, methyl, ethyl or phenyl, Z = halogen, acid radical, R2 and R3 = methyl or ethyl; X = halogen and R4 = alkylene gp.

Another novel transparent water-absorbing coating material consists chiefly of a copolymer (B) of 5-50 pts. wt. of methyl chloride salt of dimethylaminoethyl methacrylate, 5-50 pts. wt. of methyl methacrylate and 5-50 pts. wt. of isobutylmethyl methacrylate or copolymer (C) of 5-50 pts. wt. of methyl chloride salt of dimethylaminoethyl methacrylate, 5-50 pts. wt. of 5-50 pts. wt. of benzyl chloride salt of dimethylaminopropylacrylamide, 5-50 pts. wt. of methyl methacrylate and 5-50 pts. wt. of n-butyl methacrylate.

(A1) gives effective sufficient water absorption properties and (A2) prevents the copolymer from softening by water absorption. A representative (A1)/(A2) wt. ratio is 5-50 (10-30)/10-110 (30-80).

USE/ADVANTAGE - The material is used for prevention of dew formation and fogging of transparent glass and plastics, e.g. inside surfaces of car windows and transparent containers of plants and flower arrangements. The obtd. coating films have excellent resistance to water, moisture and hardness retention (pencil hardness of above F even after water absorption). Copolymers (B) and (C) have notably improved heat resistance.

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F I

技術表示箇所

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(54)【発明の名称】 透明吸水性コーティング材

(57)【要約】 (修正有)

Y

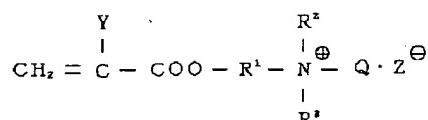
【目的】 簡単な組成物による、耐久性のあるすぐれた
防曇効果を示す組成物の提供。

I

【構成】



(a) 一般式



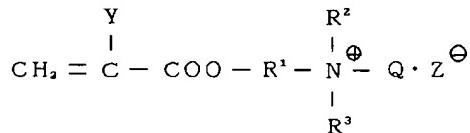
(式中、Yは水素またはメチル基、R¹は-CH₂-、C₂H₄-、-C₃H₆-よりなる群から選ばれた基、Qは水素、メチル基、エチル基またはフェニル基、Zはハロゲンまたは酸性根、R²とR³はメチル基およびエチル基よりなる群から選ばれた基、Xはハロゲン、R⁴は-CH₂-または-C₂H₄-である)で表わされる少なくとも1種のアクリル系単量体との共重合体を主成分とする透明吸水性コーティング材。

(b) 一般式

【特許請求の範囲】

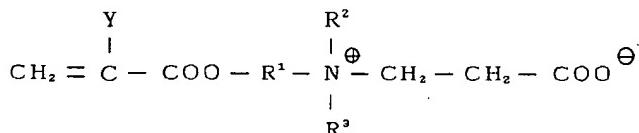
【請求項1】 (a) 一般式

(1)

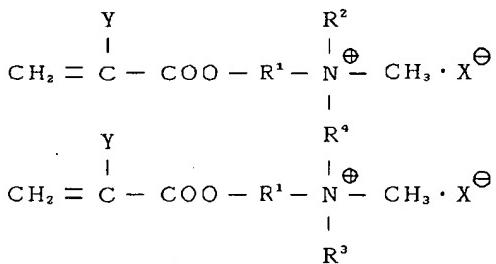


【化1】

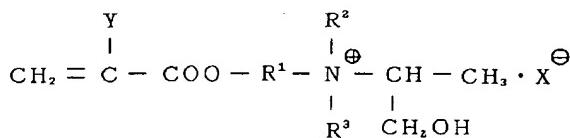
(2)



(3)



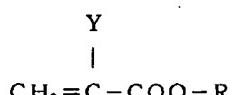
(4)



(式中、Yは水素またはメチル基、R¹は-CH₂-、-C₂H₄-、-C₃H₆-よりなる群から選ばれた基、Qは水素、メチル基、エチル基またはフェニル基、Zはハロゲンまたは酸性根、R²とR³はメチル基およびエチル基よりなる群から選ばれた基、Xはハロゲン、R⁴はアルキレン基である)で表わされる少なくとも1種の第4級アンモニウム塩含有単量体および

(b) 一般式

【化2】



(式中、Yは水素またはメチル基、Rはアルキル基である)で表わされる少なくとも1種のアクリル系単量体との共重合体を主成分とすることを特徴とする透明吸水性コーティング材。

【請求項2】 (a) ジメチルアミノエチルメタクリレートのメチルクロライド塩5～50重量部
(b) (イ) メチルメタクリレート5～50重量部

(ロ) イソ-ブチルメチルメタクリレート5～50重量部

との共重合体を主成分とすることを特徴とする透明吸水性コーティング材。

【請求項3】 (a) (イ) ジメチルアミノエチルメタクリレートのメチルクロライド塩5～50重量部
(ロ) ジメチルアミノプロピルアクリルアミドのベンジルクロライド塩5～50重量部

(b) (イ) メチルメタクリレート5～50重量部
(ロ) n-ブチルメタクリレート5～50重量部

との共重合体を主成分とすることを特徴とする透明吸水性コーティング材。

【発明の詳細な説明】

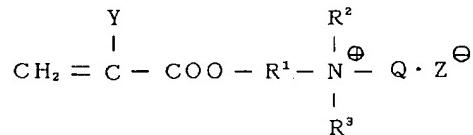
【0001】

【技術分野】本発明は、透明でかつ吸水性を有する新規なコーティング材に関する。

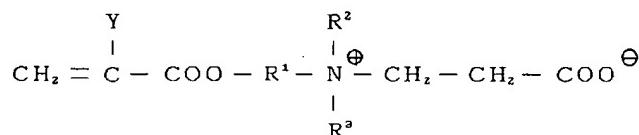
【0002】

【従来技術】従来、親水性高分子を用いてコーティング塗膜とした場合、単独では耐水性寿命が短かく、吸水すると短時間にダレ落ちてしまうことおよび吸水することにより塗膜が軟化すること等の問題があった。そこで、メラミン樹脂などを加えて架橋することにより塗膜硬度を上げたり、トリメトキシシラン化合物の单量体を分子内共重合させ硬度の改良、耐水性の改良、研究がなされてきた。その1例が特公昭60-56194号の発明で

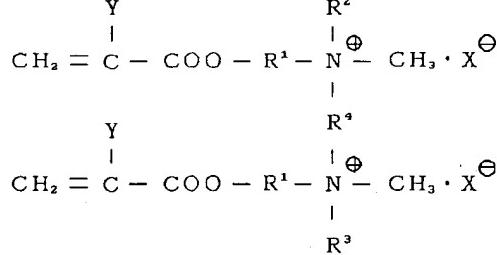
(1)



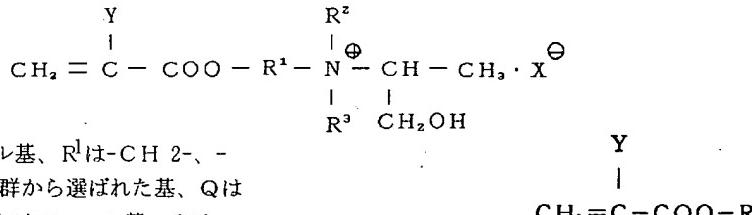
(2)



(3)



(4)



(式中、Yは水素またはメチル基、R¹は-CH₂-、-C₂H₄-、-C₃H₆-よりなる群から選ばれた基、Qは水素、メチル基、エチル基またはフェニル基、Zはハロゲンまたは酸性根、R²とR³はメチル基およびエチル基よりなる群から選ばれた基、Xはハロゲン、R⁴はアルキレン基であり、たとえば-CH₂-または-C₂H₄-のような炭素数5以下のものが好ましい)で表わされる少なくとも1種の第4級アンモニウム塩含有单量体および

(b) 一般式

【化4】

ある。これは、(イ)アルコキシシランの部分加水分解物または加水分解物、(ロ)特定の親水性单量体と特定の疎水性单量体との共重合物、(ハ)硬化触媒、(ニ)界面活性剤よりなるコーティング用樹脂組成物がガラス等の表面に防曇効果を与えることを明らかにしている。

【0003】

【目的】本発明は、特公昭60-56194号公報の組成物より簡単な組成物により、耐久性のあるすぐれた防曇効果を示す組成物を提供する点にある。

【0004】

【構成】本発明は、(a) 一般式

【化3】

(式中、Yは水素またはメチル基、Rはアルキル基である)で表わされる少なくとも1種のアクリル系单量体との共重合体を主成分とする透明吸水性コーティング材に関する。すなわち、本発明は(a)成分より選ばれたアクリル第4級アンモニウム塩含有单量体と(b)成分より選ばれたアクリル系单量体との共重合体を主成分とするコーティング材であり、これをプラスチックスやガラスの表面に塗布し、自然乾燥させることによって、透明であり露結防止や帶電防止能をもつ膜

を形成するものである。

【0005】(a) 成分と(b)成分の割合は、(a)成分により充分な吸水性が発揮でき、(b)成分によつて吸水に起因する塗膜の垂れが完全に防止できる範囲内において適宜決定する。通常、(a)5~50重量部、好ましくは10~30重量部、(b)10~110重量部、好ましくは30~80重量部の割合で共重合せらる。代表的なものとしては、

(a)ジメチルアミノエチルアクリレート5~50重量部、好ましくは10~30重量部、

(b) (イ)メタアクリル酸メチル5~60重量部、好ましくは20~50重量部、(ロ)アクリル酸ブチル5~50重量部、好ましくは10~30重量部、よりなる共重合体を、主成分とする透明吸水性コーティング材は比較的汎用のモノマーの組合せであるので、もつとも低コストで供給できる。しかしながら、耐水性、耐湿性、耐熱性は必ずしも充分ではない。

【0006】しかし、

(a)ジメチルアミノエチルメタクリレートのメチルクロライド塩5~50重量部、好ましくは5~20重量部、

(b) (イ)メチルメタクリレート5~50重量部、好ましくは10~30重量部、(ロ)イソ-ブチルメチルメタクリレート5~50重量部、好ましくは10~30重量部、

との共重合体を主成分とする透明吸水性コーティング材は、耐水性、耐湿性も優れている。また、

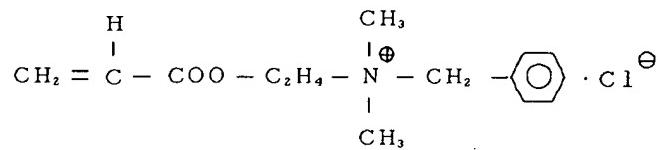
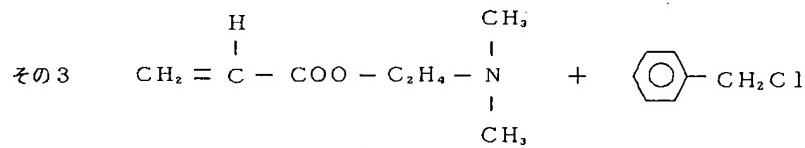
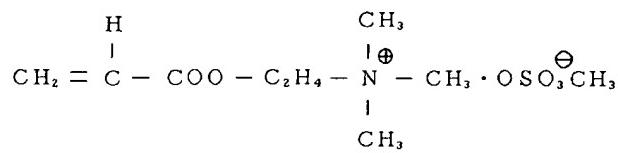
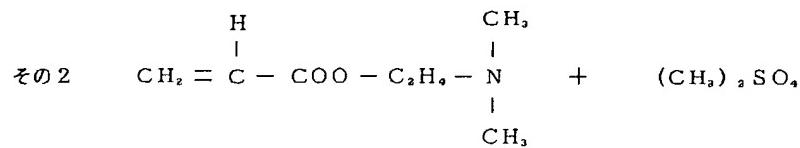
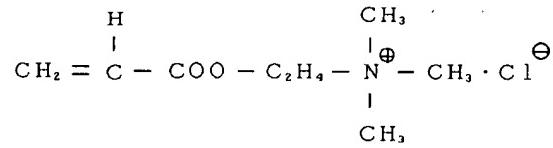
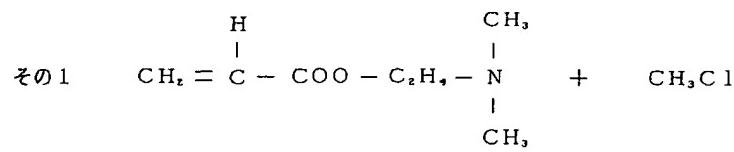
(a) (イ)ジメチルアミノエチルメタクリレートのメチルクロライド塩5~50重量部、好ましくは5~20重量部、(ロ)ジメチルアミノプロピルアクリルアミドのベンジルクロライド塩5~50重量部、好ましくは10~30重量部、

(b) (イ)メチルメタクリレート5~50重量部、好ましくは5~30重量部、(ロ)n-ブチルメタクリレート5~50重量部、好ましくは5~30重量部、

との共重合体を主成分とする透明吸水性コーティング材は、耐水性、耐湿性および耐熱性にも優れている。共重合反応はラジカル反応で行うことができる。共重合体は、通常、重量平均分子量で約20000~50000のものが好ましい。

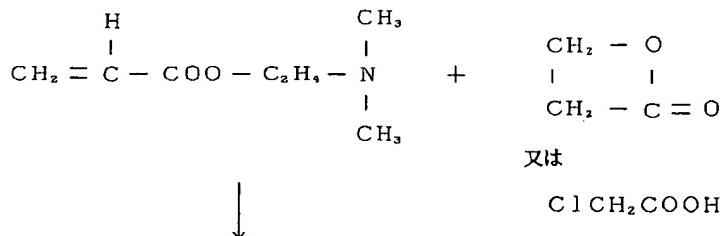
【0007】(a)(1)の単量体合成例

【化5】

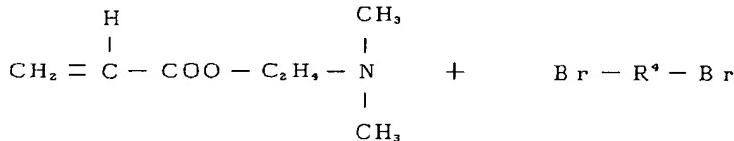
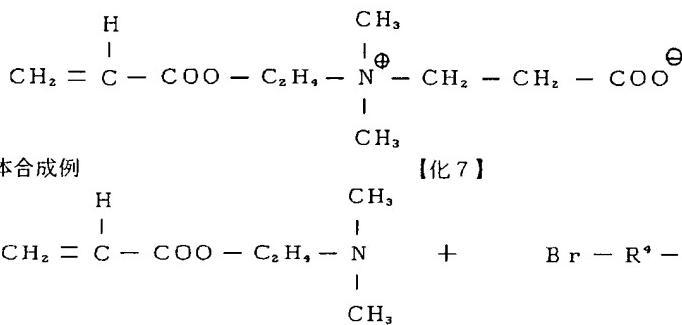


(a) (2) の単量体合成例

【化6】

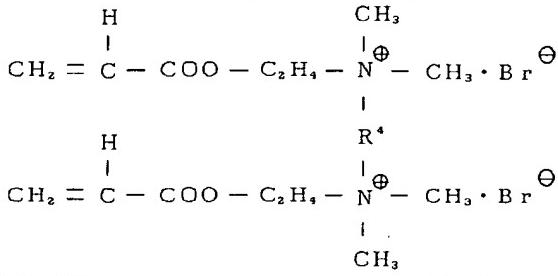


(a) (3) の単量体合成例

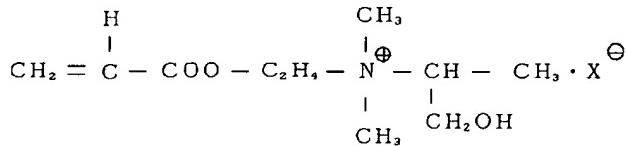
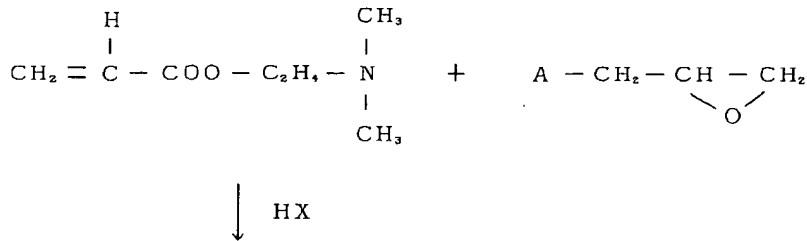


(a) (4) の単量体合成例

【化7】



【化8】



Aは、グリシジール基が結合しうる有機基（1991年1月23日化学工業日報社発行11691の化学商品第815頁～第817頁「その他エポキシ樹脂一覧表」および昭和60年5月10日（株）昭晃堂発行、垣内弘著「新エポキシ樹脂」第18頁～43頁、第58頁～第66頁、第71頁～第81頁、第97頁～第101頁参照）

照）であり、代表的なエポキシ化合物は、ビスフェノールA、各種グリシジールエステルである。前記(a)成分に属する第4級アンモニウム塩含有单量体としては、ジメチルアミノエチルアクリレートの塩酸塩、ジメチルアミノエチルアクリレートの塩化メチル塩、ジメチルアミノエチルアクリレートのベンジルクロライド塩、ジメチ

ルアミノエチルアクリレートのジメチル硫酸塩、ジメチルアミノエチルアクリレートのジエチル硫酸塩、ジメチルアミノメチルメタクリレートの塩酸塩、ジメチルアミノメチルメタクリレートの塩化メチル塩、ジメチルアミノメチルメタクリレートのベンジルクロライド塩、ジメチルアミノメチルメタクリレートのジメチル硫酸塩、ジメチルアミノメチルメタクリレートのジエチル硫酸塩、ジメチルアミノエチルアクリレートのハロゲン化物、ジメチルアミノエチルアクリレートの第4級アンモニウムハイドロオキサイドなどがある。

【0008】前記(b)成分としては、アクリル酸メチル、アクリル酸エチル、アクリル酸ブチル、アクリル酸2-エチルヘキシル、メタクリル酸メチル(MMA)、メタクリル酸エチル、メタクリル酸プロピル、メタクリル酸ブチル(n-BMA)、メタクリル酸イソブチル(i-BMA)、メタクリル酸ターンシャリーブチル(t-BMA)、メタクリル酸シクロヘキシル、メタクリル酸オクチル、メタクリル酸イソデシル、メタクリル酸2-エチルヘキシル、メタクリル酸ラウリル、メタクリル酸ラウリルトリデシル、メタクリル酸トリデシル、メタクリル酸セチルステアリル、メタクリル酸ステアリル、メタクリル酸ベンジル等がある。

【0009】

【実施例】

実施例1

メタアクリル酸メチル40重量部、アクリル酸ブチル40重量部、ジメチルアミノエチルアクリレートのCH₃C₁第4級塩(DMAEA塩)20重量部、アゾビスイソブチロニトリル0.3重量部、ラウリルメルカプタン1重量部を容器内で混合し、混合物をポリエチレン袋(15cm×30cm)に入れて密閉し、厚さ10mm程度の袋詰めとする。これを厚さ1mmのSUS板でサンドイッチ状にし、70℃の恒温槽に沈め5時間重合する。淡黄色透明な重合物が生成した。これをメタノールに溶解し40重量%溶液として、ガラスまたはプラスチック表面にエースプレー塗布し、乾燥後結露実験を行った。プラスチックスにあっては、透明性、結露防止性が得られ、かつ表面抵抗を10⁷Ωまで下げる事ができた。

程度の袋詰めとする。これを厚さ1mmのSUS板でサンドイッチ状にし、70℃の恒温槽に沈め5時間重合する。淡黄色透明な重合物が生成した。これをメタノールに溶解し40重量%溶液として、ガラスまたはプラスチック表面にエースプレー塗布し、乾燥後結露実験を行った。プラスチックスにあっては、透明性、結露防止性が得られ、かつ表面抵抗を10⁷Ωまで下げる事ができた。

【0010】実施例2

メタアクリル酸メチル40重量部、アクリル酸ブチル40重量部、ジメチルアミノプロピルメタアクリラミドのCH₃C₁第4級塩20重量部、アゾビスイソブチロニトリル0.3重量部、ラウリルメルカプタン1重量部を容器内で混合し、混合物をポリエチレン袋(15cm×30cm)に入れて密閉し、厚さ10mm程度の袋詰めとする。これを厚さ1mmのSUS板でサンドイッチ状にし、70℃の恒温槽に沈め5時間重合する。淡黄色透明な重合物が生成した。これをメタノールに溶解し40重量%溶液として、ガラスやプラスチック表面にエースプレー塗布し、自然乾燥後結露実験を行った。プラスチックスにあっては、透明性、結露防止性が得られ、かつ表面抵抗を10⁷Ωまで下げる事ができた。表1はポリカーボネートに本発明材料を25μmエースプレー塗装で塗布し、自然乾燥後の塗膜性能を測定した結果である。密着性、結露性、耐候性、帯電防止性共に良好であった。なお、実施例1および2の40重量%メタノール溶液をグリコールエーテルで希釈し、固形分20重量%溶液とし、フォードカップNo.4の方法により測定した結果、いずれも32秒/20℃であった。

【表1】

表1. 本発明コーティング樹脂の塗膜性能

塗膜性能 実施例	鉛筆硬度	結露性	密着性 (基盤目試験)	耐候性	耐水性 (常温)
実施例1	F	結露せず 透明	100/100	650時間 異常なし	48時間 異常なし
実施例2	F	結露せず 透明	100/100	650時間 異常なし	48時間 異常なし

【0011】実施例3～5

前記と同様の要領で、実施した。その組成と結果は表2

のとおりである。

【表2】

	実施例3	実施例4	実施例5
MMA	8	8	8
n-BMA	20	-	10
i-BMA	-	20	-
t-BMA	-	-	10
DMAEMA(*1)	15	15	15
DMAPAA(*2)	-	-	-
透 明 性	○	○	○
吸 水 性	○	○	○
防 曙 性	○	○	○
耐 水 性	×	○	○
耐 热 性	×	△	×

*1 DMAEMAは、ジメチルアミノエチルメタクリレートのメチルクロライド塩の80重量%水溶液

*2 DMAPAAは、ジメチルアミノプロピルアクリルアミドのベンジルクロライド塩の80重量%水溶液

【0012】実施例6

ジメチルアミノエチルメタクリレートと塩化メチルとを反応させることにより得られたジメチルアミノエチルメタクリレートのメチルクロライド塩（80重量%水溶液）15重量部、メチルメタクリレート8重量部、イソブチルメタクリレート20重量部とを全モノマーに対し、2重量%の重合触媒（アゾビスイソブチロニトリル）と溶媒（メタノール：酢酸メチル=2.7:1）37重量部の存在下に70℃で6時間反応させた。冷却後、エチレングリコールモノブチルエーテル20重量部で希釈する。

【0013】実施例7

ジメチルアミノエチルメタクリレートと塩化メチルとを反応させることにより得られたジメチルアミノエチルメタクリレートのメチルクロライド塩（80重量%水溶液）7.5重量部、ジメチルアミノプロピルアクリルアミドと塩化ベンジルとを反応させることにより得られたジメチルアミノプロピルアクリルアミドのベンジルクロライド塩（80重量%水溶液）7.5重量部、メチルメタクリレート8重量部、n-ブチルメタクリレート20重量部とを、全モノマーに対し、2重量%の重合触媒（アゾビスイソブチロニトリル）と溶媒（メタノール：酢酸メチル=2.7:1）37重量部の存在下に、70℃で6時間反応させた。冷却後、エチレングリコールモノブチルエーテル20重量部で希釈する。実施例6と7の結果を表3に示す。

【表3】

	実施例6	実施例7
MMA	8	8
n-BMA	—	20
i-BMA	—	—
t-BMA	20	—
DMAEMA(*1)	15	7.5
DMAPAA(*2)	—	7.5
透明性	○	○
吸水性	○	○
防曇性	○	○
耐水性	○	○
耐熱性	×	○

*1 DMAEMAは、ジメチルアミノエチルメタクリレートのメチルクロライド塩の80重量%水溶液

*2 DMAPAAは、ジメチルアミノプロピルアクリルアミドのベンジルクロライド塩の80重量%水溶液
【0014】

【効果】本発明のコーティング材は、透明で吸水性を有するので、透明なガラスやプラスチックスの結露防止に

有効であるだけでなく、吸水していても鉛筆硬度F以上であるため、自動車ガラス窓の内面にコーティングしても充分実用に耐える性能を発揮する。また、植木鉢や生花を収納した透明容器等の結露防止、曇り防止に有用である。そのうえ、請求項2の発明の塗膜は耐水性、耐湿性が、また、請求項3の発明の塗膜は耐水性、耐湿性に加えて耐熱性も改良された。

KOKAI PATENT APPLICATION NO. HEI 5-295317

TRANSPARENT WATER ABSORBING COATING MATERIAL

[Translated from Japanese]

[Translation No. LPX20189]

JAPANESE PATENT OFFICE (JP)

PATENT JOURNAL (A)

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December 10, 1991

Country:

Japan (JP)

No.:

Hei 3-349990

TRANSPARENT WATER ABSORBING COATING MATERIAL

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 Patent attorney
 and 1 other

[There are no amendments to this patent.]

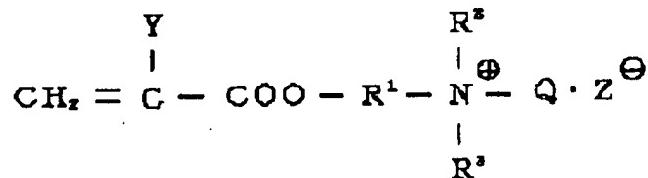
(54) [Title of the Invention]

Transparent, absorbing coating material

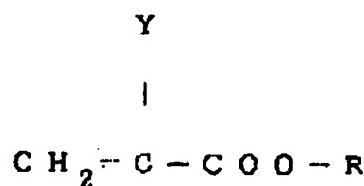
(57) [Abstract] (Rewritten)

[Purpose] The purpose of the present invention is to produce a composition with a simple structure having a long-lasting defogging effect.

[Constitution] A transparent, absorbing coating material having a copolymer made of (a) a monomer containing at least one of the quaternary ammonium salt represented by general formula



(Wherein, Y is either a hydrogen or a methyl group, R¹ is a group selected from among the groups consisting of -CH₂-, C₂H₄-, or -C₃H₆-, Q is a hydrogen, methyl group, ethyl group or phenyl group, Z is halogen or acid group, R² and R³ are selected from methyl and ethyl groups, X is a halogen, R⁴ is -CH₂- or -C₂H₄) and (b) at least one acrylic type monomer represented by the general formula



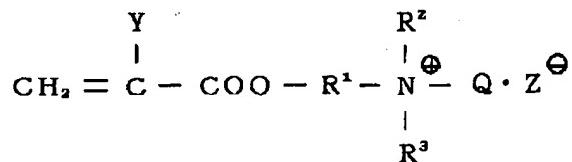
(Wherein, Y is hydrogen or methyl group, and R is an alkyl group)
as the main components.

[Claims of the invention]

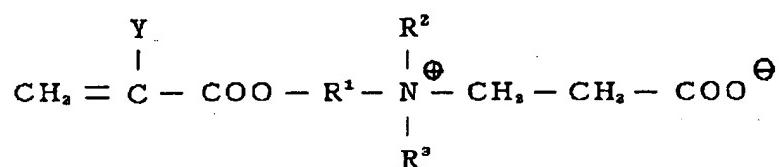
[Claim 1] A transparent, absorbing coating material having a copolymer made of (a) a monomer containing at least one quaternary ammonium salt represented by the general formula

[Chemical Formula 1]

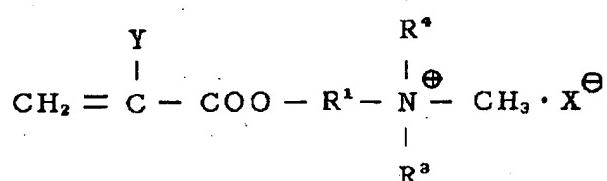
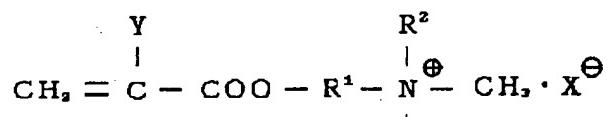
(1)



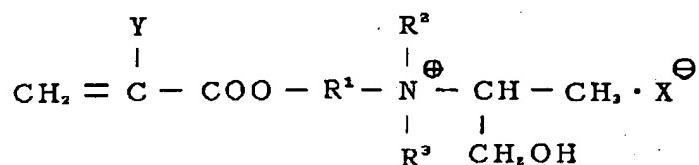
(2)



(3)



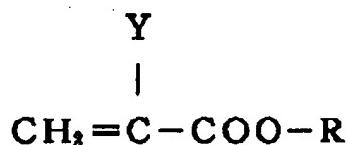
(4)



(Wherein, Y is either a hydrogen or methyl group, R¹ is a group selected from -CH₂-, C₂H₄- or -C₃H₆-, Q is a hydrogen, methyl group, ethyl group, or phenyl group, Z is a halogen or acid root,

R^2 and R^3 are groups selected from among methyl groups and ethyl groups, X is a halogen, R^4 is an alkylene group) and (b) at least one acrylic type monomer represented by general formula

[Chemical formula 2]



(Wherein, Y is a hydrogen or methyl group, and R is an alkyl group)

as the main component.

[Claim 2] The transparent, absorbing coating material characterized by the fact that a copolymer comprising (a) 5~50 parts by weight of a methyl chloride salt of dimethyl aminoethyl methacrylate, (b) (b-1) 5~50 parts by weight of methyl methacrylate and (b-2) 5~50 parts by weight of iso-butylmethyl methacrylate is included as the main component.

[Claim 3] The transparent, absorbing coating material characterized by the fact that a copolymer comprising (a) (a-1) 5~50 parts by weight of a methyl chloride salt of dimethyl aminoethyl methacrylate and (a-2) benzyl chloride salt of dimethyl amino propyl acrylamide, (b) (b-1) 5~50 parts by weight of methylmethacrylate and (b-2) 5~50 parts by weight of n-butyl methacrylate is included as the main component.

[Detailed description of the invention]

[0001]

[Technical field of the invention] The present invention pertains to a new type of transparent, absorbing coating material.

[0002]

[Prior art] In the past, when formation of coated film is performed with a hydrophilic polymer, problems such as short water resistance, formation of running in a short time upon absorption of water, and softening of coated film as a result of softening occur. Thus, a resin such as melamine resin is added and crosslinking is performed to increase the hardness of the coated film, or intramolecular copolymerization is performed for a monomer of trimethoxy silane compound and an improvement in the water resistance and researches were performed. As an example, the invention described in Japanese Kokoku [Examined] Patent Application No. Sho 60-56194 can be mentioned. In this case, it is known that defogging performance is achieved by a resin composition for coating made of (a) a partial hydrolysate or hydrolysate of alkoxy silane, (b) copolymer of a specific hydrophilic monomer and a specific hydrophobic monomer, (c) a curing catalyst and (d) a surfactant.

[0003]

[Purpose] The purpose of the present invention is to produce a composition having a superior wear resistance having a simpler composition than the composition of Japanese Kokoku [Examined] Patent Application No. Sho 60-56194 [1985].

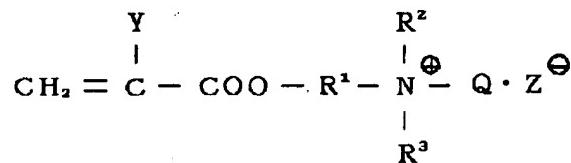
[0004]

[Constitution] The present invention pertains to a transparent, absorbing coating material having

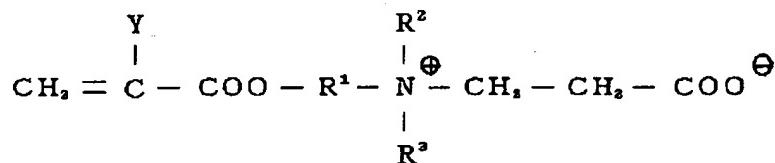
a copolymer made of (a) a monomer containing at least one type of quaternary ammonium salt shown in general formula

[Chemical formula 3]

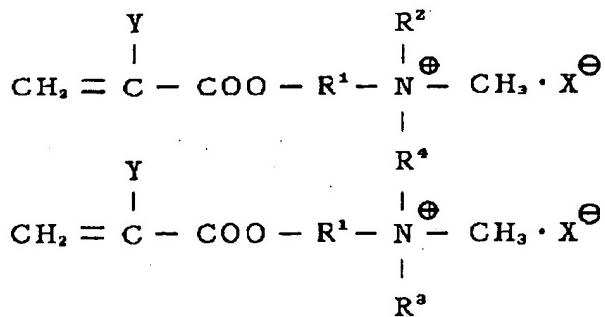
(1)



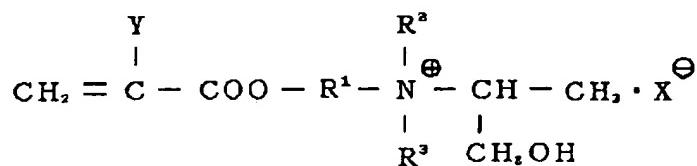
(2)



(3)

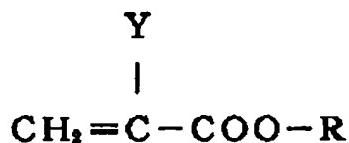


(4)



(Wherein, Y is either a hydrogen or methyl group, R¹ is a group selected among the group of -CH₂-, C₂H₄- or -C₃H₆-, Q is a hydrogen, methyl group, ethyl group or phenyl group, Z is a halogen or acid root, R² and R³ are groups selected from methyl and ethyl groups, X is a halogen, R⁴ is an alkylene group and those with 5 or fewer carbon atoms, such as -CH₂- and -C₂H₄ are desirable) and (b) at least one type of acrylic type monomer shown in general formula.

[Chemical Formula 4]



(Wherein, Y is a hydrogen or methyl group, and R is an alkyl group)

as the main component. In other words, the present invention is a coating material mainly comprising a copolymer of a monomer containing an acrylic quaternary ammonium salt selected from component (a), and an acrylic type monomer selected from component (b), and the above-mentioned copolymer is coated onto the surface of a plastic or glass and naturally dried to produce a transparent film with defogging performance and antistatic performance.

[0005] The mixing ratio of component (a) and component (b) can be appropriately determined in such a manner that adequate absorption can be achieved by component (a) and running of the coated film can be adequately blocked by component (b). In general, copolymerization is carried out at the rate of 5~50 parts by weight, preferably 10~30 parts by weight, of component (a) and 10~110 parts by weight, preferably 30~80 parts by weight, of component (b). For example, a transparent, absorbing coating material mainly comprising (a) 5~50 parts by weight, preferably 10~30 parts by weight of dimethylaminoethylacrylate,

(b) (b-1) 5~60 parts by weight, preferably 20~50 parts by weight, of methylmethacrylate, (b-2) 5~50 parts by weight, preferably 10~30 parts by weight, of butyl acrylate, is suitable since the composition is a combination of relatively common monomers; thus, production can be carried out at a low cost. However, water resistance, moisture resistance, and heat-resistance are not necessarily adequate.

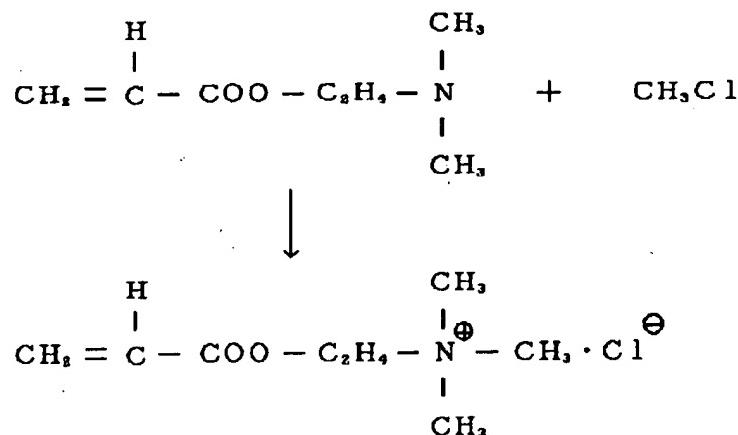
[0006] However, a transparent, absorbing coating material mainly comprising (a) 5~50 parts by weight, preferably 5~20 parts by weight, of methyl chloride salt of dimethylaminoethyl acrylate, (b) (b-1) 5~50 parts by weight, preferably 10~30 parts by weight of methyl methacrylate, (b-2) 5~50 parts by weight, preferably, 10~30 parts by weight, of isobutyl methyl methacrylate displays excellent water resistance and moisture resistance. Furthermore, a transparent, absorbing coating material mainly comprising (a) (a-1) 5~50 parts by weight, preferably, 5~20 parts by weight, of methyl chloride salt of dimethyl aminoethyl methacrylate, (a-2) 5~50 parts by weight, preferably, 10~30 parts by weight, of benzyl chloride salt of dimethyl aminopropyl acrylamide,

(b) (b-1) 5~50 parts by weight, preferably 5~30 parts by weight, of methyl methacrylate (b-2) 5~50 parts by weight, preferably 5~30 parts by weight, of n-butyl methacrylate displays excellent water resistance, moisture resistance and heat-resistance. In this case, the polymerization reaction can be achieved by radical reaction. In general, a copolymer with a weight average molecular weight in a range of 20000~50000 is desirable.

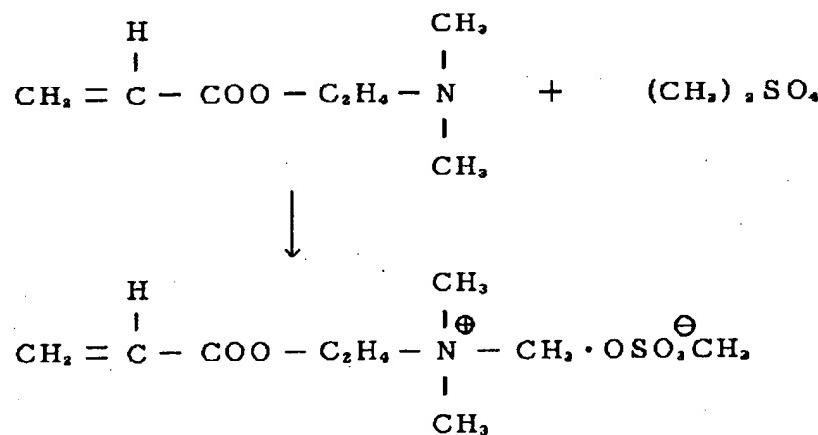
[0007] Synthesis example of (a) (1)

[Chemical formula 5]

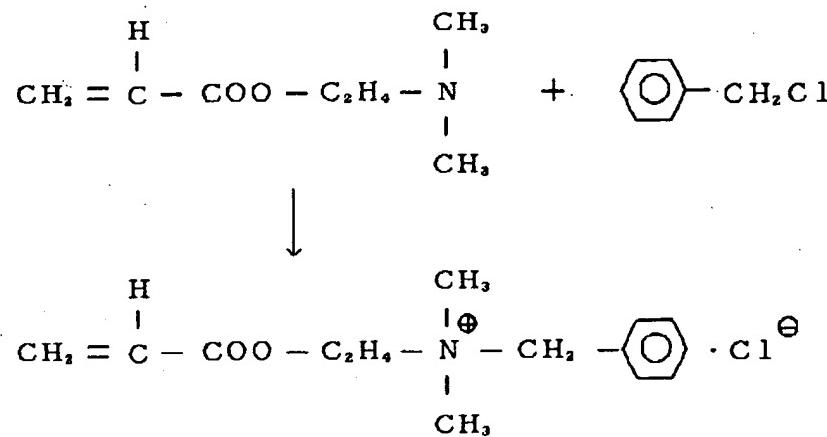
No. 1



No. 2

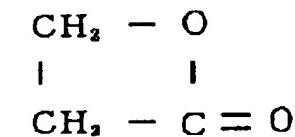
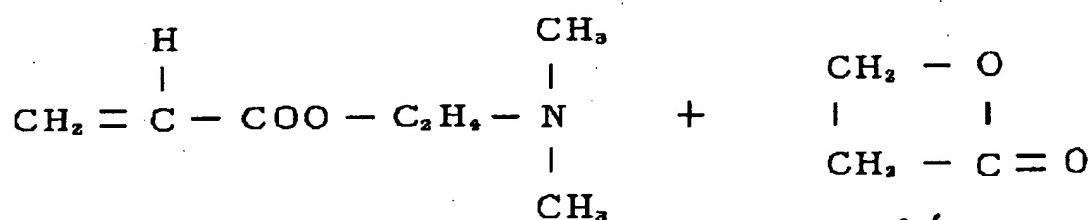
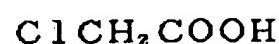


No. 3

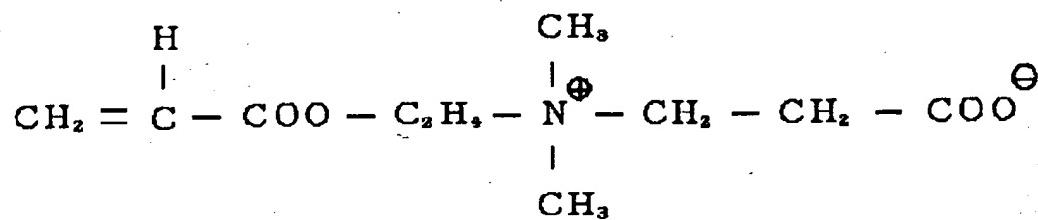


Synthesis Example of (a) (2)

[Chemical Formula 6]

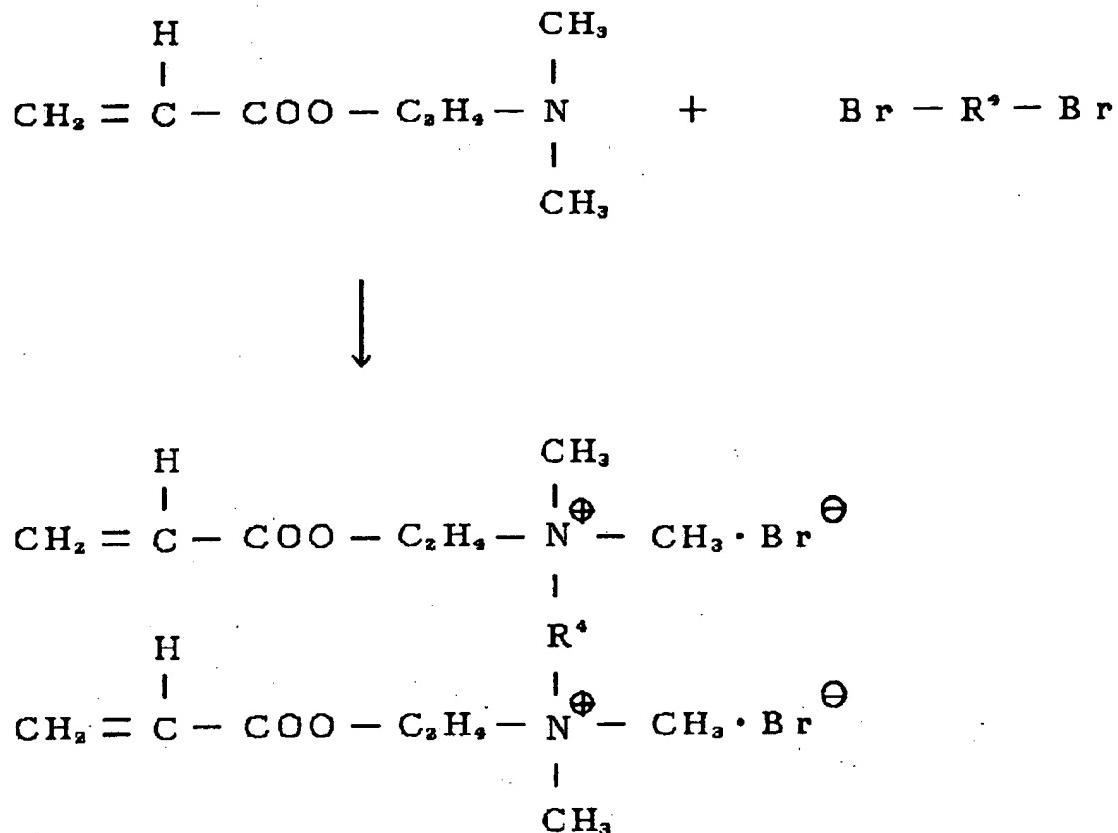
又は *or*

Or



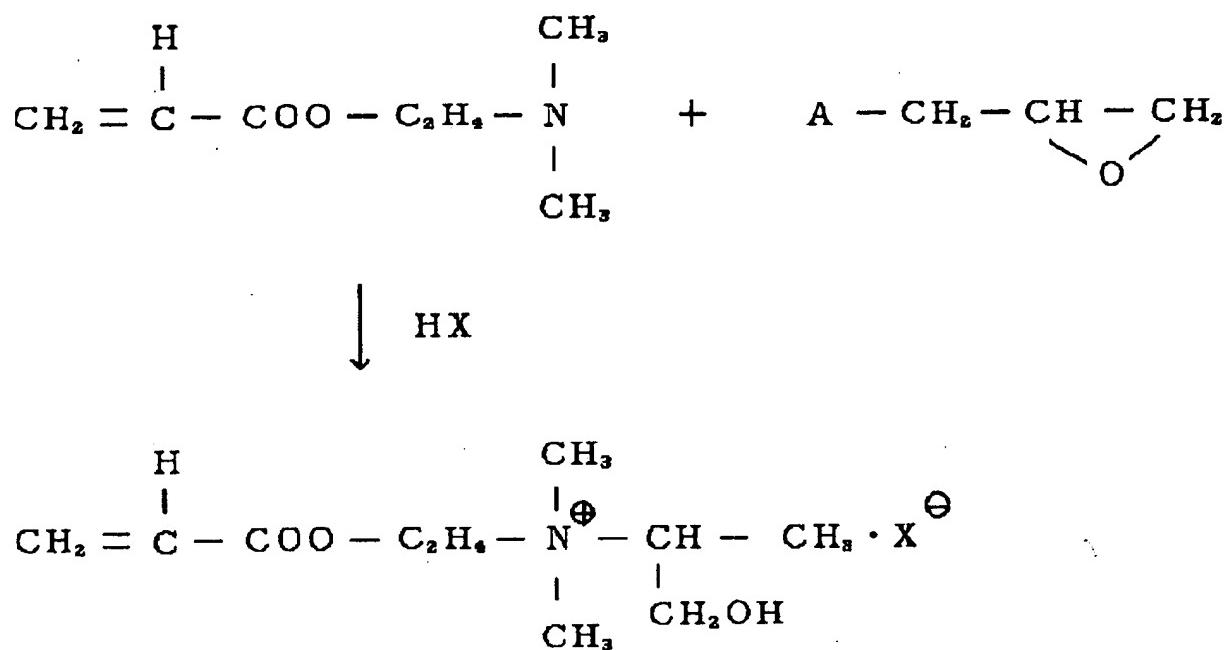
Synthesis Example of (a) (3)

[Chemical Formula 7]



Synthesis Example of (a) (4)

[Chemical Formula 8]



A is an organic group where glycidyl group can be bonded (see Chemical Products No.11691, pp. 815-817 "Epoxy resin List" published by J. Chem. Daily, January 23, 1991, and Hiroshi Kakiuchi, "New Epoxy Resins" pp. 18-43, pp. 58-66, pp. 71-81 and pp. 97-101, May 10, 1985, Shokodo Publishing House, for reference), and as a typical epoxy compound, bisphenol A and many different types of glycidyl ester can be mentioned. For the monomer containing quaternary ammonium salt of the aforementioned component (a), hydrochloride of methyl amino ethyl acrylate, methylhydrochloride of dimethylaminoethyl acrylate, benzyl chloride salt of dimethylamino ethyl acrylate, dimethylsulfate of dimethylamino ethylacrylate, diethyl sulfate of dimethylamino ethylacrylate, hydrochloride of dimethylamino ethylacrylate, methyl chloride of

dimethylaminomethyl methacrylate, benzyl chloride salt of dimethylamino methyl methacrylate, dimethyl sulfate of dimethylamino methyl methacrylate, diethyl sulfate of dimethylamino methyl methacrylate, halide of dimethylamino ethyl acrylate, hydroxide of dimethylamino ethyl acrylate, etc. can be mentioned.

[0008] For the aforementioned component (b), methyl acrylate, ethyl acrylate, butyl acrylate, 2-ethylhexyl acrylate, methyl methacrylate (MMA), ethyl methacrylate, propyl acrylate, butyl methacrylate (n-BMA), isobutyl methacrylate (i-BMA), tert-butyl methacrylate (t-BMA), cyclohexyl methacrylate, octyl methacrylate, isodecyl methacrylate, 2-ethylhexyl methacrylate, lauryl methacrylate, lauryltridecyl methacrylate, tridecyl methacrylate, cetylstearyl methacrylate, stearyl methacrylate, benzyl methacrylate, etc. can be mentioned.

[0009]

[Application Examples]

Application Example 1

Mixing was carried out for 40 parts by weight of methyl methacrylate, 40 parts by weight of butyl acrylate, 20 parts by weight of CH_3Cl quaternary salt of dimethylaminoethyl acrylate (DMAEA salt), 0.3 parts by weight of azobisisobutyronitrile and 1 parts by weight of lauryl mercaptan in a container, and the mixture produced was placed in a polyethylene bag (15 cm x 30 cm) and sealed so as to produce a bagging with a thickness of approximately 10 mm. It was then sandwiched between SUS sheets with a thickness of 1 mm and placed in a constant temperature bath of 70°C and a polymerization reaction was performed for 5 hours. As a result, a transparent light yellow colored polymer was produced. It was then dissolved in methanol to form 40 wt% of solution, and air spray coating was performed onto the surface of a glass or plastic, drying was

performed and then, dew condensation test was performed. In the case of plastic, good transparency and dew condensation resistance were achieved, and furthermore, it was possible to reduce the surface resistance to 10^7 ohms.

[0010] Application Example 2

Mixing was carried out for 40 parts by weight of methyl methacrylate, 40 parts by weight of butyl acrylate, 20 parts by weight of CH_3Cl quaternary salt of dimethyl aminopropyl acryl amide, 0.3 parts by weight of azobisisobutyronitrile and 1 part by weight of lauryl mercaptan in a container, and the mixture produced was placed in a polyethylene bag (15 cm x 30 cm) and sealed so as to produce a bag with a thickness of approximately 10 mm. It was then sandwiched between SUS sheets with a thickness of 1 mm and placed in a constant temperature bath of 70°C and a polymerization reaction was carried out for 5 hours. As a result, a transparent light yellow colored polymer was produced. It was then dissolved in methanol to form 40 wt% of solution, and air spray coating was performed onto the surface of a glass or plastic, drying was performed and then, dew condensation test was performed. In the case of plastic, good transparency and dew condensation resistance were achieved, and furthermore, it was possible to reduce the surface resistance to 10^7 ohms. Coating was performed for the material of the present invention onto a polycarbonate using air spray coating method, and the coated film produced after natural drying was examined, and the results obtained are shown in Table I below. Adhesion, dew condensation resistance, weather resistance, antistatic performance were all good. Furthermore, dilution was performed for 40 wt% methanol solutions of Application Example 1 and Application Example 2 to produce solutions with a solid parts of 20 wt% and when a measurement was performed according to the method of the Ford coupler No. 4, 32

seconds/20°C was achieved in all cases.

[Table I]

Table I Performance of coated film of resin of the present invention

Coated film performance	Pencil hardness	Dew condensation resistance	Adhesion (cross-cut adhesion test)	Weather resistance	Water resistance (ambient temperature)
Application Example 1	F	Transparent and absence of dew condensation	100/100	Normal up to 650 hours	Normal up to 48 hours
Application Example 2	F	Transparent and absence of dew condensation	100/100	Normal up to 650 hours	Normal up to 48 hours

[0011] Application Examples 3~5

Tests were done as described above. The compositions used and results obtained are shown in Table II below.

[Table II]

	Application Example 3	Application Example 4	Application Example 5
MMA	8	8	8
n-BMA	20	---	10
i-BMA	---	20	---
t-BMA	---	---	10
DMAEMA(*1)	15	15	15
DMAPAA(*2)	---	---	---
Transparency	○	○	○
Absorption	○	○	○
Defogging performance	○	○	○
Water resistance	X	○	○
Heat-resistance	X	Δ	X

*1 DMAEMA is 80 wt% solution of methyl chloride salt of dimethyl aminoethyl methacrylate

*2 DMAPAA is 80 wt% solution of benzyl chloride salt of dimethyl aminopropyl acrylamide

[0012] Application Example 6

A reaction was carried out for 15 parts by weight of methyl chloride salt of dimethylaminoethyl methacrylate (80 wt% solution) produced by performing a reaction for dimethyl aminoethyl methacrylate and methyl chloride, 8 parts by weight of methyl methacrylate, and 20 parts by weight of isobutyl methacrylate in 37 parts by weight of solvent (methanol: methyl acetate= 2.7:1) and in the presence of 2 wt% polymer catalyst (azobisisobutyronitrile) at 70°C for 6 hours.

After cooling, dilution was performed with 20 parts by weight of ethylene glycol monobutyl ether.

[0013] Application Example 7

A reaction was carried out for 7.5 parts by weight of methyl chloride salt of dimethyl aminoethyl methacrylate (80 wt% solution) produced by performing a reaction between dimethyl aminoethyl methacrylate and methyl chloride, 7.5 parts by weight of benzyl chloride salt of dimethylaminopropyl acrylamide produced by performing a reaction between dimethyl aminopropyl acrylamide and benzyl chloride (80 wt% solution) and 8 parts by weight of methylmethacrylate in 37 parts by weight of solvent (methanol: methyl acetate= 2.7:1) and in the presence of 2 wt% polymer catalyst (azobisisobutyronitrile), at 70°C for 6 hours. After cooling, dilution was performed with 20 parts by weight of ethylene glycol monobutyl ether. The results of Application Example 6 and 7 are shown in Table III.

[Table III]

	Application Example 6	Application Example 7
MMA	8	8
n-BMA	---	20
i-BMA	---	---
t-BMA	20	---
DMAEMA(*1)	15	7.5
DMAPAA(*2)	---	7.5
Transparency	○	○
Absorption	○	○
Defogging performance	○	○
Water resistance	○	○
Heat-resistance	x	○

*1 DMAEMA is 80 wt% solution of methyl chloride salt of dimethylaminoethyl methacrylate

*2 DMAPAA is 80 wt% solution of benzyl chloride salt of dimethylaminopropyl acrylamide

[0014]

[Effect of the invention] The coating material of the present invention is transparent and absorbent, and can be used effectively against dew condensation of transparent glass and plastics. Furthermore, a pencil hardness of at least F can be achieved even under absorption, thus, the coating material can be used effectively for coating of glass windows of automobiles. Furthermore, the coating material can be effectively used for dew condensation and defogging performance of transparent containers used for flowers, etc. Furthermore, water resistance and moisture resistance are improved in the coated film of Claim 2 of the present invention, and water resistance, moisture resistance and heat-resistance are improved in the coated film of Claim 3 of the present invention.